Abstract Submitted
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Quantum Pumping in Graphene Nanoribbons[1] TEJINDER KAUR, Dept. of Physics and Astronomy, Ohio University, LILIANA ARRACHEA, Dept. de Fisica, Universidad de Buenos Aires, Argentina, NANCY SANDLER, Dept. of Physics and Astronomy, Ohio University — The interest in the development of devices at the nanoscale has intensified the search for mechanisms that provide control of transport properties while reducing effects of heat dissipation and contact resistance. Charge pumping, in which dc currents are generated in open-quantum systems by applying local de-phased time-dependent potentials, may achieve these goals. We analyze the properties of non-equilibrium zero-bias currents through nanoribbons using a tight-binding Hamiltonian and the Keldysh formalism beyond the adiabatic and perturbative regimes. Using a numerical implementation with two local single-harmonic time-dependent potentials, we first contrast results for 1d and 2d metallic systems (square lattice). Next, we focus on quasi-1d systems and graphene ribbons, and discuss the role of reservoirs. We analyze the dependence of the dc pumped current as a function of different parameters such as chemical potential, pumping amplitude, and frequency. We observe a considerable increase of pumped current with the dimensionality of the system. Furthermore, we show that lattice mismatch with reservoirs favors the pumping mechanism for graphene ribbons.

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